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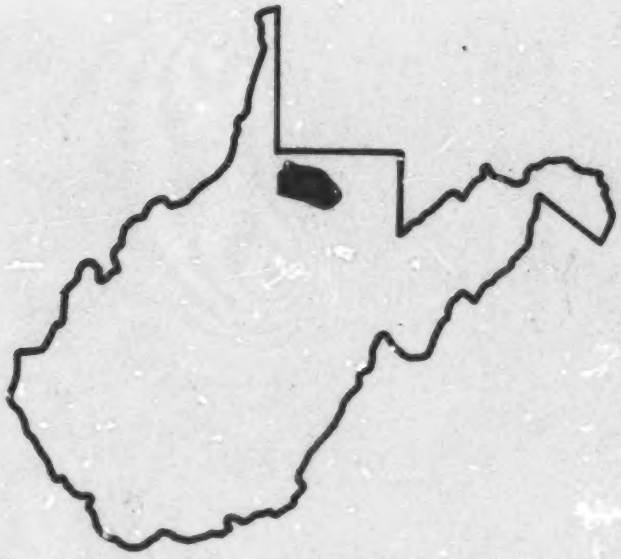
FLOOD INSURANCE STUDY

CITY OF FAIRMONT, WEST VIRGINIA
MARION COUNTY



JULY 2, 1987

Federal Emergency Management Agency

COMMUNITY NUMBER - 540099

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NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY
CITY OF FAIRMONT, MARION COUNTY, WEST VIRGINIA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the City of Fairmont, Marion County, West Virginia, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were prepared by the U. S. Army Corps of Engineers (COE), Pittsburgh District, for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-E-1153, Project Order No. 1, Amendment No. 20. This work was completed in June 1985.

1.3 Coordination

On August 2, 1983, an initial Consultation and Coordination Officer's (CCO) meeting was held with representatives from FEMA, the city, and the COE (the study contractor) to determine the streams to be studied by detailed methods. Coordination of this study involved Notice of Initiation letters, public meetings, and incidental meetings with City Officials. Notice of Initiation letters dated December 1, 1983, announced the start of the study and were sent to all Federal, State, county, and local government agencies and private firms that could possibly make input to the study.

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On June 19, 1986, a final CCO meeting was held with representatives from FEMA, the city, and the study contractor to review the results of the study.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the City of Fairmont, Marion County, West Virginia. The area of study is shown on the Vicinity Map (Figure 1).

The following streams were studied by detailed methods for their entire lengths within the community: the Monongahela River, the Tygart Valley River, the West Fork River, Buffalo Creek, and Hickman Run. Sheet flow occurs on the left bank of Hickman Run from approximately 350 feet downstream of King Street to the downstream end of the culvert under Owens Glass Plant. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction through June 1990.

2.2 Community Description

The City of Fairmont is located in central eastern Marion County in north-central West Virginia. The total land area contained within Fairmont is 7.7 square miles. Fairmont is surrounded by the unincorporated area of Marion County and is located approximately 10 miles southwest of the City of Morgantown. According to the U. S. Bureau of the Census, the population of Fairmont was 23,863 in 1980, an 8.5 percent decrease from 26,093 in 1970 (Reference 1).

The Monongahela River, with a drainage area of 7,386 square miles, joins the Allegheny River in Pittsburgh, Pennsylvania, to form the Ohio River. The Monongahela River, which flows north, is formed by the Tygart Valley River and the West Fork River in the City of Fairmont. The headwaters of the Monongahela River are located on the western slopes of the Appalachian Mountains in Lewis, Upshur, and Randolph Counties in northwestern West Virginia.

Most of the Monongahela River watershed is forested with some agriculture in the southern portion of the basin. Residential and industrial developments are located in the valleys of the river. Within the community, local relief above the stream valley varies from a low of 800 feet to an average hilltop elevation of 1,250 feet. The average slope of the Monongahela River is approximately 2 feet per mile, and the valley floor width in the area averages approximately 500 feet.

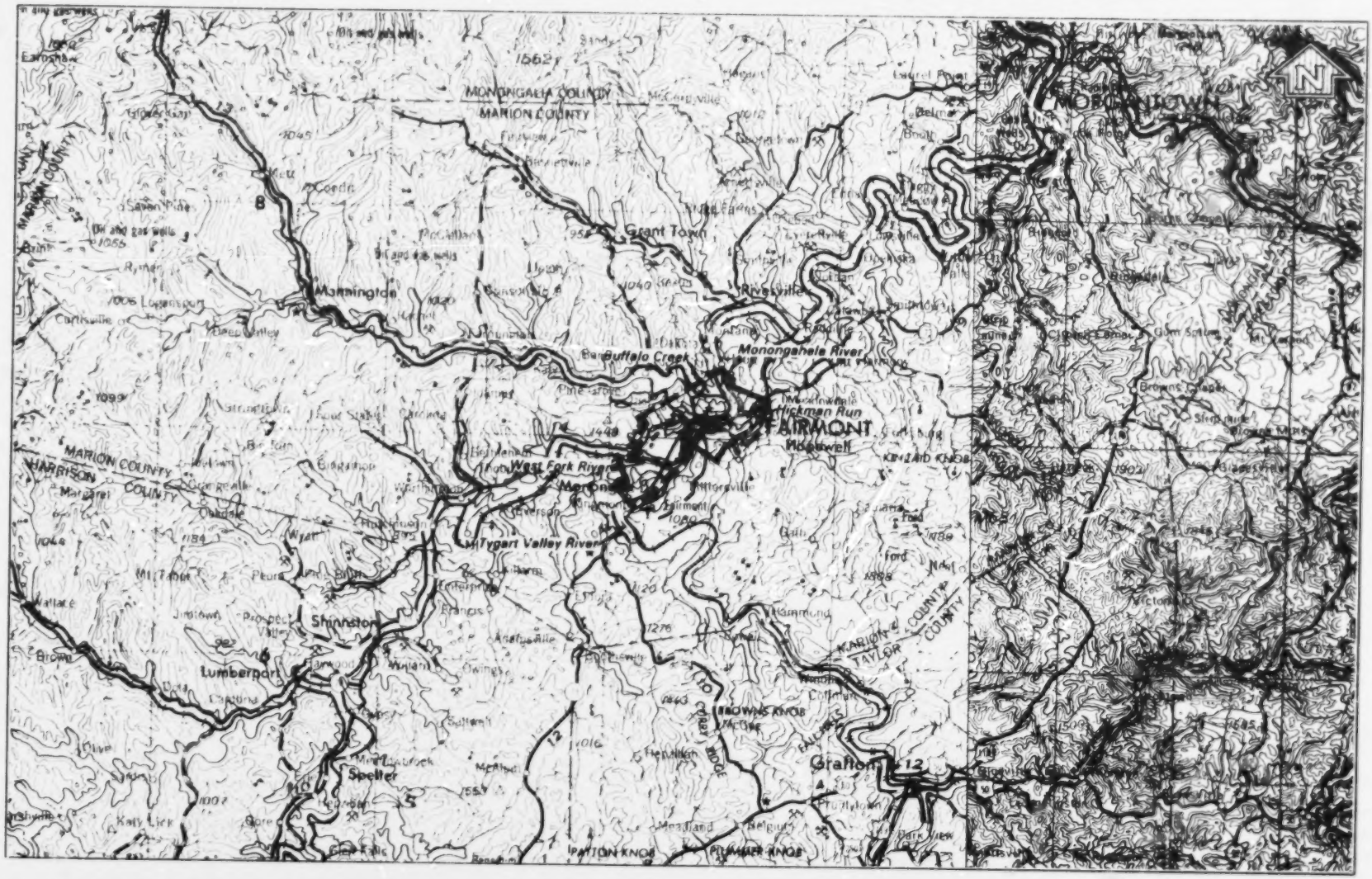

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF FAIRMONT, WV

(MARION CO.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

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The Tygart Valley River, with a total drainage area of 1,374 square miles, joins with the West Fork River to form the Monongahela River in Fairmont. The headwaters of the Tygart Valley River are located on the western slopes of the Applachian Mountains in Randolph County in northwestern West Virginia. The river flows in a northern direction throughout its entire length. The gradient of the Tygart Valley River is approximately 4 feet per mile. Local relief above the stream valley varies from a low of 800 feet to an average hilltop elevation of 1,200 feet.

The West Fork River, with a drainage area of 881.4 square miles, joins the Tygart Valley River in the City of Fairmont to form the Monongahela River. The West Fork River basin is situated in the unglaciated Allegheny Plateau in northern West Virginia. It is bordered on the east by the Tygart Valley River basin, on the west by the Little Kanawha River, and on the south by the Kanawha River basin. The river flows in an eastern direction throughout the community. The average slope along the West Fork River is approximately 2.3 feet per mile; the valley floor is approximately 0.1 mile wide. Local relief above the stream valley varies from a low of 800 feet to an average hilltop elevation of 1,200 feet.

Buffalo Creek, with a drainage area of 125 square miles, joins the Monongahela River in Fairmont. Buffalo Creek is also situated in the unglaciated Allegheny Plateau in northern West Virginia. It is bounded to the south by the West Fork River basin, to the west by the Little Kanawha River basin, and to the north by the Dunkard Creek basin. Buffalo Creek flows in an eastern direction throughout the community. In Fairmont, it has a relatively narrow floodplain, and an average slope of less than 1 foot per mile.

Hickman Run, with a drainage area of 2.6 square miles, joins the Monongahela River at river mile 126.1 in Fairmont. Hickman Run is bounded to the south by the Tygart Valley River basin and to the east and north by the Cheat River basin. Hickman Run flows in a northeastern direction through a section of Fairmont and then makes an abrupt turn to the west before entering the Monongahela River. It has a narrow floodplain and flows through culverts under buildings for over 2,600 feet. The average slope throughout the community is 60 feet per mile.

The climate for this area is temperate with seasonal variation in temperature. Fairmont is geographically located in a region of both polar and tropical air mass activity, subjected to continental and maritime invasion. The weather is usually moderate but may have occasional rapid changes resulting from frontal air mass movements. Temperatures range from an average of 34 degrees Fahrenheit (°F) in February to an average of 74°F in July. Measurable precipitation occurs on an average of 110 days a year and amounts to an annual average of 44 inches.

2.3 Principal Flood Problems

Although the main flood period on the Monongahela River is usually from December to April, the largest known flood occurred in July 1888. In Fairmont, other large floods have occurred on the Monongahela River in March 1905, January 1907, January 1917, March 1918, and January 1919. Fairmont received only minimal flooding from the November 1985 flood event. The following tabulation presents floods on the Monongahela River at Hoult, West Virginia, since Tygart Dam was placed in operation in 1938.

Date of Crest	Actual Stage (Feet)	Elevation (Feet)	Discharge (cfs)
March 7, 1967	*	863.0	85,000
March 5, 1963	19.9	869.5	83,500
March 20, 1963	17.8	867.4	61,200
February 14, 1948	17.4	867.0	57,400
December 14, 1956	15.6	865.2	51,800
April 12, 1948	16.3	865.9	48,900
February 4, 1939	15.9	865.5	45,800
August 7, 1956	15.9	865.5	45,800

*From highwater profile after operation of Opekiska Lock and Dam
NOTE: Gage Zero Elevation = 849.6 Feet

Although major floods have occurred on the Tygart Valley River and West Fork River at various times of the year, the main flood season is usually December through April. Most of the floods during this period are the result of heavy rain and snowmelt. It is possible for large floods with a duration of several days to occur at any time of the year. Although summer floods are not common on the Tygart Valley and West Fork Rivers, the flood of July 1888 is the largest known flood, in spite of reduction by Tygart Dam and Stonewall Jackson Dam now under construction. The following tabulation presents major floods on the West Fork River as recorded at USGS gage No. 03061000 located at river mile 11.95 in Enterprise, West Virginia.

Date of Crest	Actual Stage (Feet)	Elevation (Feet)	Discharge (cfs)
March 7, 1967	28.05	897.50	36,500
March 5, 1963	27.84	897.29	36,000
February 14, 1948	25.56	895.01	31,400
May 24, 1968	25.20	894.65	31,000
December 14, 1956	24.45	893.90	30,000
August 6, 1956	24.43	893.88	30,000
March 20, 1963	24.10	893.55	29,100
February 1, 1951	23.22	892.67	27,700

NOTE: Gage Zero Elevation = 869.45 Feet

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The main flood season for Buffalo Creek is usually May through October. Although most of the floods during this period result from short duration intense thunderstorms during the summer months, Buffalo Creek is also subject to winter-spring flooding as the result of snowmelt combined with heavy rain. Buffalo Creek, within the community, is also subject to backwater flooding from the Monongahela River. The following tabulation presents major floods on Buffalo Creek at USGS gage No. 03061500, stream mile 4.63 at Barrackville, West Virginia.

Date of Crest	Actual Stage (Feet)	Elevation (Feet)	Discharge (cfs)
April 12, 1948	16.00	898.42	9,300
May 28, 1956	15.90	898.32	9,170
August 18, 1980	15.68	898.10	9,150
June 13, 1951	15.36	897.78	8,520
March 5, 1963	15.30	897.72	8,460
June 2, 1946	15.30	897.72	7,620
June 11, 1963	14.76	897.18	7,620
July 3, 1978	14.23	896.65	7,550

NOTE: Gage Zero Elevation = 882.42 Feet

The main flood season for Hickman Run usually occurs from June to October. Hickman Run, due to its basin size, shape, and steep slope, is susceptible to flash flooding from short duration thunderstorms.

2.4 Flood Protection Measures

There are two upstream flood control dams and reservoirs in the Monongahela River basin that are effective in reducing flood levels at Fairmont by approximately 5 to 6 feet. Above the confluence with the Monongahela River, approximately 57 percent of the drainage area of the Tygart Valley and West Fork Rivers is controlled by these dams and reservoirs. On Buffalo Creek, there are four Soil Conservation Service dams that will reduce flood flows on upper Buffalo Creek but have a negligible effect at the downstream end. At the present time there are no flood protection structures on Hickman Run, and there are no plans for any such structures in the foreseeable future.

The following tabulation presents pertinent data for the two COE projects in the Monongahela River Basin upstream of Fairmont, West Virginia.

Dam and Reservoir	Miles Upstream of Fairmont	Drainage Area (Square Miles)	Date Placed in Operation
Tygart Valley River			
Tygart Dam			
Tygart Lake	23.1	1,1	1938
West Fork River			
Stonewall Jackson Dam			
Stonewall Jackson Lake	73.9	102	1987*

*Estimated completion date

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each flooding source studied in detail affecting the community.

Natural discharge-frequency curves on the Monongahela and the West Fork Rivers were developed following the standard log-Pearson Type III analysis as outlined by the USGS Bulletin 17B (Reference 2). The stage

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discharge records used in the analysis of the Monongahela River were obtained from a 59-year record for the COE Lock and Dam No. 15 and the USGS gaging station at Lock and Dam No. 15 at Hoult, West Virginia. This gaging station was operated jointly by the COE and the USGS until it was removed due to construction of the Opekiska Lock and Dam. Flood flow frequencies developed at this gaging station were modified by means of an average reduction curve to reflect reduction by the upstream flood control reservoirs. The stage discharge records used in the analysis for the West Fork River were obtained from the USGS gaging station No. 0306100 operated by the COE and the USGS from a 42-year record at Enterprise, West Virginia. Flood flow frequencies developed at the gaging stations were modified by means of an average reduction curve to reflect reduction by the upstream flood control reservoir.

The frequency flows on the Tygart Valley River could not be developed following the standard Log-Pearson Type III analysis since the flow is regulated by Tygart Dam. The peak flows on the Tygart Valley River as recorded at the USGS gaging station No. 03057000 at Colfax, West Virginia, are usually the result of local runoff and peak reservoir releases at least a day after the Monongahela River has crested. These flows are greater than the flows computed by combining the Monongahela River and the West Fork River. Thus, the Tygart Valley River frequency flows represent flows computed from the peak releases of the Tygart Dam.

Natural discharge-frequency curves on Buffalo Creek were developed following the standard log-Pearson Type III analysis as outlined in USGS Bulletin 17B (Reference 2). The stage discharge records used in the analysis of Buffalo Creek were obtained from a 52-year record for the USGS gaging station No. 03061500 at Barrackville, West Virginia. The present gaging station, operated by the COE and the USGS, is located approximately 4 miles upstream of its confluence with the Monongahela River. To obtain the flows at its mouth, flood flow frequencies developed at the gaging station were increased using a drainage area relationship.

There are no gages or stream flow records available for Hickman Run. Flows for the 10-, 50-, 100-, and 500-year floods were computed using multiple regression formulas developed by the Pittsburgh District COE (Reference 3). The formulas were developed from natural flow frequencies for watersheds with drainage areas between 0.5 and 90 square miles and relate discharge to drainage area, channel slope and watershed shape.

A summary of drainage area-peak discharge relationships for the streams studied by detailed methods is shown in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
MONONGAHELA RIVER					
At confluence of West Fork and Tygart Valley Rivers	2,259	50,870	69,080	79,210	97,120
At downstream corporate limits	2,389	57,240	78,830	89,800	112,460
TYGART VALLEY RIVER					
At confluence with Monongahela River	1,374	14,470	18,630	22,910	24,620
WEST FORK RIVER					
At confluence with Monongahela River	881	36,400	50,450	56,300	72,500
BUFFALO CREEK					
At confluence with Monongahela River	125	8,130	10,530	11,470	13,870
HICKMAN RUN					
At confluence with Monongahela River	2.6	544	929	1,120	1,790

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross-section data for the backwater analyses for the Monongahela River, and portions of the Tygart Valley and West Fork Rivers near their confluence with the Monongahela River were taken from the COE soundings and topographic maps at a scale of 1:2,400 with a contour interval of 5 feet (Reference 4). Field sections surveyed from January to March 1975 were utilized for the upstream segments of the Tygart Valley and West Fork Rivers. Field inspections were made to assure that the data obtained in previous years remains representative. Cross-section data for Buffalo Creek and Hickman Run were obtained from topographic maps compiled from aerial photographs at a scale of 1:4,800 with a contour interval of 4 feet (Reference 5). All bridges and culverts were field surveyed to obtain elevation data and structural geometry.

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Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the Flood Insurance Rate Map (Exhibit 2). Along certain portions of Hickman Run, a profile base line is shown on the maps to represent channel distances as indicated on the flood profiles and floodway data tables.

Water-surface elevations of floods of the selected recurrence intervals for the Monongahela River were computed using the COE 22-J2-L212 step-backwater computer program (Reference 6). Water-surface elevations for the Tygart Valley River, the West Fork River, Buffalo Creek, and Hickman Run were computed through the use of the COE HEC-2 step-backwater computer program (Reference 7). Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals.

Starting water-surface elevations for the Monongahela River were obtained from a continuation of profiles started at least 9 miles downstream, where a constant pool level is normally maintained by the Opekiska Navigation Dam. Starting water- surface elevations for the Tygart Valley River were computed using coincidental flooding with the Monongahela River elevations at the time of the peak of the Tygart Valley River. Starting water-surface elevations for the West Fork River were based on coincidental flooding with the Monongahela River. Starting water-surface elevations for Buffalo Creek and Hickman Run were based on the constant pool elevation for the Monongahela River.

Channel and overbank roughness factors (Manning's "n") used in the hydraulic computations for the Monongahela, Tygart Valley, and West Fork Rivers were chosen on the basis of field inspection. Verification of roughness requirements were also used to reproduce profiles for known floods for which high-water marks were obtained and flow quantities were measured or easily calculated. For the Monongahela River, the well-defined floods of March 1963, March 1967, and January 1974 were reproduced successfully using the channel "n" value of 0.030, and the overbank "n" value of 0.060. The well-defined flood of January 1974 was reproduced successfully for the Tygart Valley River using the channel "n" value of 0.030 and the overbank "n" value of 0.070. For the West Fork River, the well-defined floods of July 1888, March 1963, May 1968, December 1972, and November 1973 were reproduced successfully using the channel "n" value of 0.032, and the overbank "n" value of 0.070. Channel and overbank roughness factors for Buffalo Creek and Hickman Run were chosen on the basis of field inspection. The channel "n" value for Buffalo Creek was 0.040, and the overbank "n" value was 0.080. The channel "n" values for Hickman Run ranged from 0.020 to 0.045, and the overbank "n" values ranged from 0.020 to 0.080.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the maps; the descriptions of the marks are presented in Elevation Reference Marks (Exhibit 3).

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For the streams studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:4,800 with a contour interval of 4 feet (Reference 5).

The boundaries of the sheet flow area were also delineated using topographic maps at a scale of 1:4,800 with a contour interval of 4 feet (Reference 5).

The 100- and 500-year floodplain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE), and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

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4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections (Table 2). The computed floodways are shown on the Flood Insurance Rate Map (Exhibit 2). In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown. Portions of the floodway widths for Tygart Valley River and West Fork River extend beyond the corporate limits.

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "Without Floodway" elevations presented in Table 2 for certain downstream cross sections of the Tygart Valley River, Buffalo Creek, and Hickman Run are lower than the regulatory flood elevations in that area, which must take into account the 100-year flooding due to backwater from other sources.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Monongahela River								
A	124.90[1]	540	12,136	7.40	869.5	869.5	870.5	1.0
B	125.72[1]	535	13,195	6.00	871.1	871.1	871.9	0.8
C	127.09[1]	515	12,035	6.58	872.8	872.8	873.5	0.7
D	128.43[1]	460	11,492	6.89	874.7	874.7	875.2	0.5
Tygart Valley River								
A	0.36[2]	378[4]	7,392	4.1	875.1	869.8[5]	870.8	1.0
B	1.02[2]	470[4]	8,613	3.5	875.1	870.3[5]	871.2	0.9
C	1.28[2]	456[4]	8,422	3.6	875.1	870.5[5]	871.4	0.9
West Fork River								
A	0.170[2]	310	6,926	8.1	875.4	875.4	875.9	0.5
B	0.800[2]	280	6,516	8.6	877.1	877.1	877.5	0.4
C	1.625[2]	462[4]	10,976	5.1	879.5	879.5	879.8	0.3
Buffalo Creek								
A	210[3]	154	1,555	7.4	870.7	862.1[5]	862.1	0.0
B	1,950[3]	132	1,682	6.8	870.7	865.3[5]	865.3	0.0
C	3,930[3]	82	1,248	9.2	870.7	867.8[5]	868.0	0.2

[1]Miles above confluence with Ohio River
[2]Miles above confluence with Monongahela River
[3]Feet above confluence with Monongahela River
[4]This width extends beyond corporate limits
[5]Elevation computed without consideration of backwater from Monongahela River

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF FAIRMONT, WV
(MARION CO.)

FLOODWAY DATA

MONONGAHELA RIVER - TYGART VALLEY RIVER - WEST FORK RIVER - BUFFALO CREEK

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FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Buffalo Creek (continued)								
D	5,280	156	1,767	6.5	871.7[2]	870.2	870.7	0.5
E	6,330	107	1,363	8.4	872.8[2]	871.7	872.1	0.4
Hickman Run								
A	120	39	112	10.0	872.0	861.3[3]	861.3	0.0
B	1,600	35	111	10.1	890.5	890.5	890.5	0.0
C	2,300	39	115	9.7	911.6	911.6	911.9	0.3
D	2,780	65	201	5.6	915.8	915.8	916.5	0.7
E	3,810	37	129	8.7	922.3	922.3	922.8	0.5
F	4,200	66	291	3.9	933.0	933.0	933.0	0.0
G	4,990	38	114	9.9	940.8	940.8	940.8	0.0
H	5,590	20	54	9.4	961.9	961.9	962.8	0.9
I	6,260	40	275	1.9	966.4	966.4	967.4	1.0
J	7,260	59	416	1.2	966.5	966.5	967.5	1.0
K	7,550	40	318	1.6	966.6	966.6	967.6	1.0
L	8,000	130	970	1.2	966.7	966.7	967.7	1.0
M	8,420	90	683	1.6	966.8	966.8	967.8	1.0
N	8,590	120	623	1.8	966.8	966.8	967.8	1.0
O	9,400	100	175	4.8	970.1	970.1	970.6	0.5

[1]Feet above confluence with Monongahela River
[2]Elevation computed using combined frequency analysis
[3]Elevation computed without consideration of backwater from Monongahela River

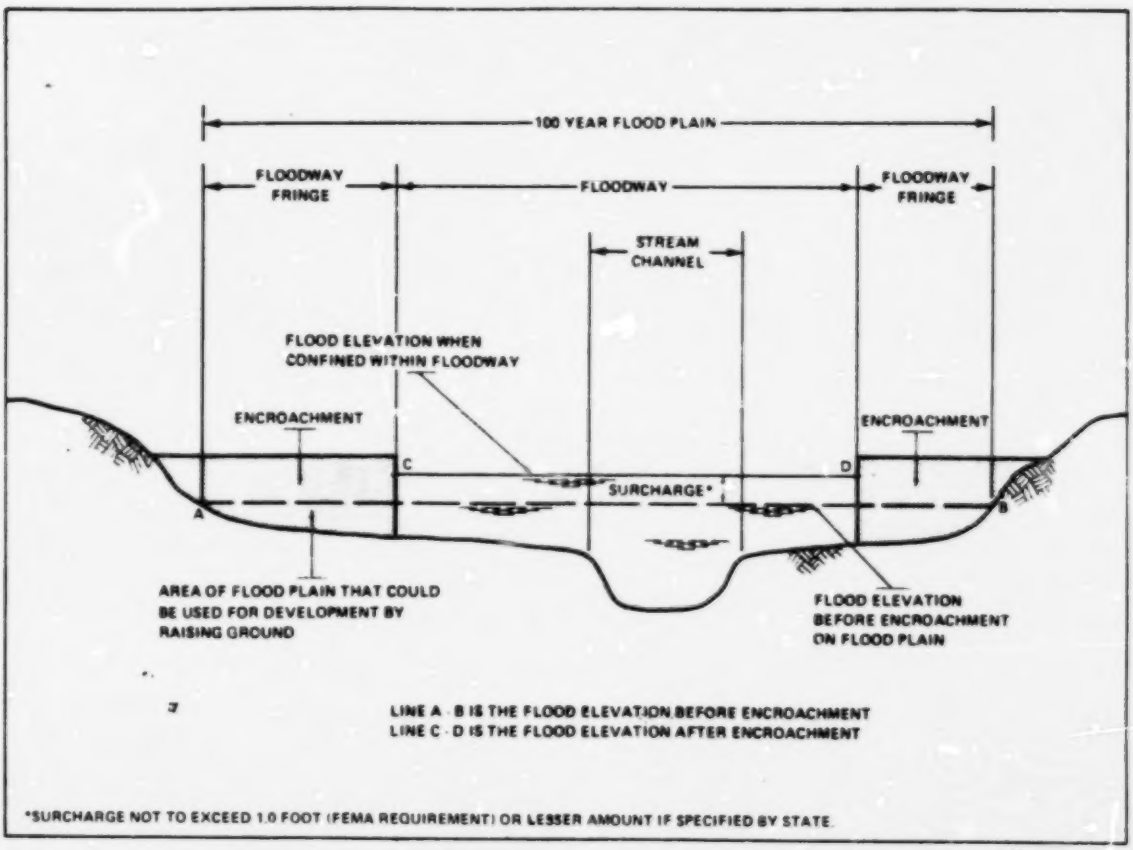
TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF FAIRMONT, WV
(MARION CO.)

FLOODWAY DATA

BUFFALO CREEK - HICKMAN RUN


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FLOODWAY SCHEMATIC

Figure 2

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

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Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the detailed hydraulic analyses are shown within this zone.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 100-year floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, and to areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100- and 500-year floodplains. Floodways and the locations of selected cross sections used in the hydraulic analyses and floodway computations are shown where applicable.

7.0 OTHER STUDIES

The COE has published a Flood Plain Information Report for Marion County, Pennsylvania (Reference 8). That report concerns the flooding of the Monongahela, Tygart Valley, and West Fork Rivers, and the effect of their flooding on major tributaries.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, Liberty Square Building (Second Floor), 105 South Seventh Street, Philadelphia, Pennsylvania 19106.

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9.0 BIBLIOGRAPHY AND REFERENCES

1. U. S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, West Virginia, Washington, D. C., U. S. Government Printing Office, 1981.

2. U. S. Department of the Interior, Geological Survey, Office of Water Data Collection, Interagency Advisory Committee on Water Data, "Guidelines for Determining Flood Flow Frequency," Bulletin 17B, Reston, Virginia, Revised September 1981.

3. U. S. Army Corps of Engineers, Pittsburgh District, "Untitled Regression Data," Pittsburgh, Pennsylvania, 1975.

4. U. S. Army Corps of Engineers, Pittsburgh District, Topographic Maps of the Monongahela River, Pittsburgh to Fairmont, Scale 1:2,400, Contour Interval 4 Feet, 1952.

5. Michael Baker, Jr., Inc. of Beaver, Pennsylvania, Topographic Maps compiled from aerial photographs, Scale 1:4,800, Contour Interval 4 Feet: Fairmont, West Virginia, taken in November 1984.

6. U. S. Army Corps of Engineers, Backwater Computation Program 22 J2 L212, Sacramento, California, June 1967.

7. U. S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Generalized Computer Program, Davis, California, October 1973.

8. U. S. Army Corps of Engineers, Pittsburgh District, Flood Plain Information, Marion County, West Virginia, Pittsburgh, Pennsylvania, 1975.

EXHIBIT 3 - ELEVATION REFERENCE MARKS

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 1	01	922.99	L cut in top of concrete banister at southeast bank end of U. S. Route 19 open concrete arch bridge over Buffalo Creek.
RM 2	01	889.49	PK set in pole No. MPCo. 1P 9116, 40 feet north of centerline of Chessie System bridge over Goose Run and approximately 300 feet west of industrial park at south side of dirt road.
RM 3	01	888.14	PK set in pole No. MPCo. 1P 3445, 50 feet north of centerline of Chessie System near small transformer station, 400 feet west of rail mile post No. 2 and approximately 900 feet west of U. S. Route 250 bridge over the West Fork River.
RM 4	01	890.946	Standard stamped disk, 12 feet west of centerline of west Chessie System track and 141 feet south of pole No. 300+13 at northwest corner of Chessie System bridge over the Monongahela River.
RM 5	01	889.933	Standard stamped disk in top of second stone from southeast end of southeast wing wall of Chessie System bridge over the Monongahela River, 18 feet south of south rail of main track, and opposite pole No. 300+28.

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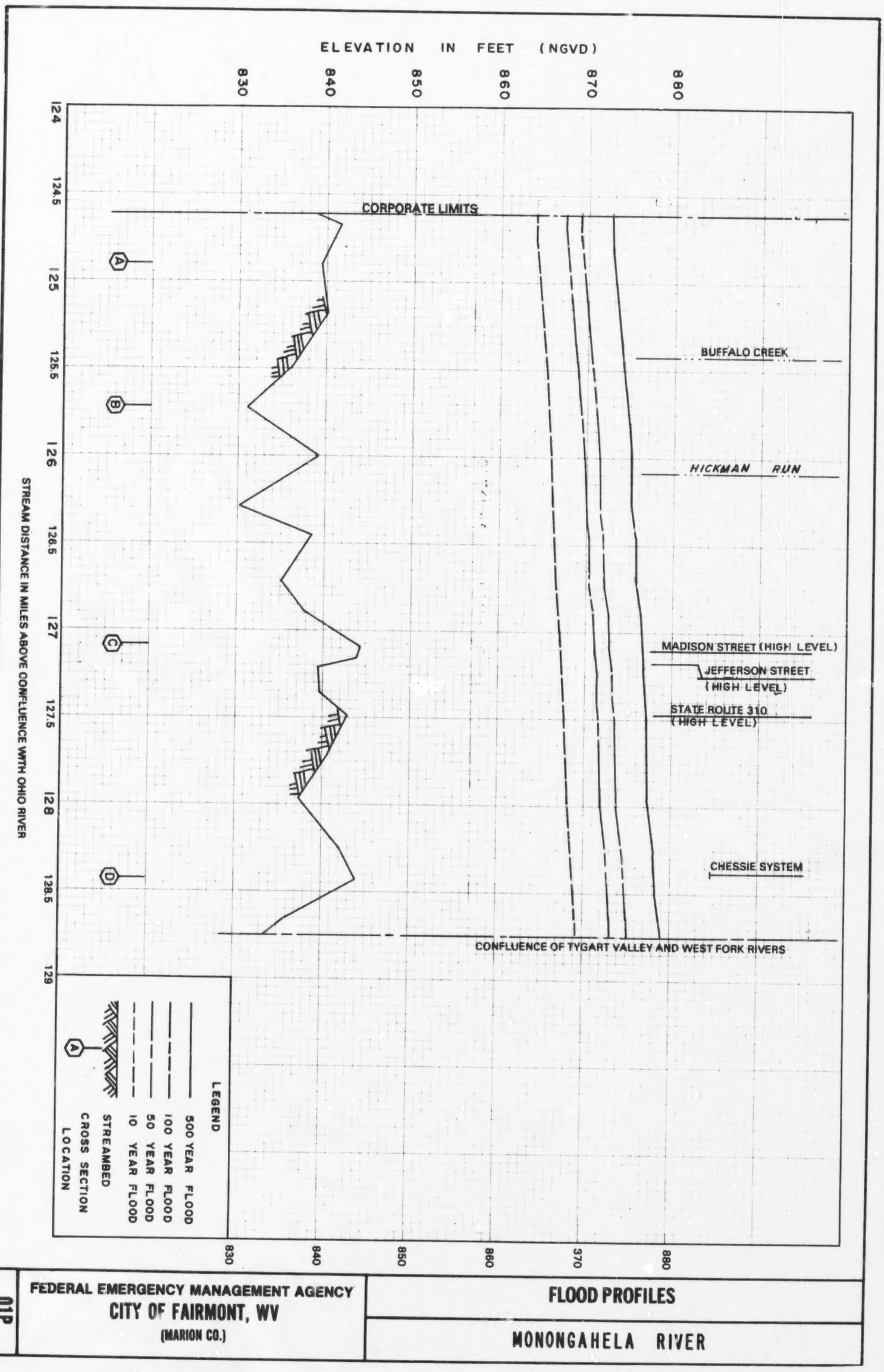
EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 6	01	971.90	L cut into northwest bank of concrete headwall of Hickman Run box culvet under Grafton Road.
RM 7	02	963.24	L cut into top of southeast end of concrete retaining wall at upstream end of 2,600 foot long box culvert under Owens Glass Plant.
RM 8	02	944.66	Square cut in top of 7 foot diameter concrete pipe at downstream end of 2,600 foot long culvert under Owens Glass Plant.
RM 9	02	908.14	Nail cluster around bolt in tie, 0.9 foot below top rail, at northeast bank of wood abutment of abandoned railroad trestle spanning Hickman Run.
RM 10	02	882.40	Nail cluster around 2.5 inch bolt, 2.5 feet below rail, at southwest bank end of wood railroad trestle spanning Hickman Run.
RM 11	02	876.44	Existing L (painted BM 1-695) cut on top of southeast bank of stone abutment of steel railroad bridge over Buffalo Creek at confluence with the Monongahela River.



01P	FEDERAL EMERGENCY MANAGEMENT AGENCY CITY OF FAIRMONT, WV (MARION CO.)	FLOOD PROFILES MONONGAHELA RIVER

21

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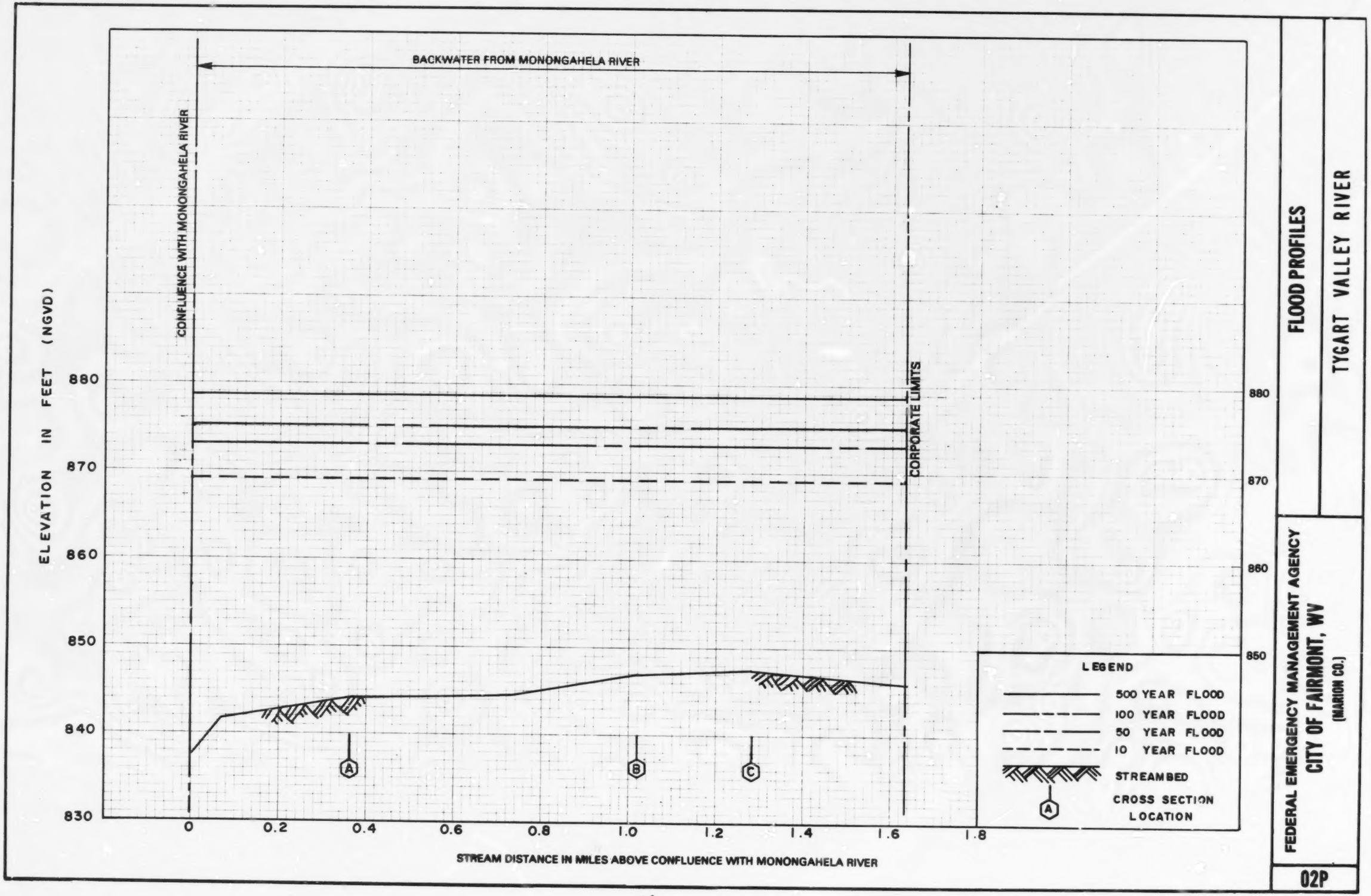

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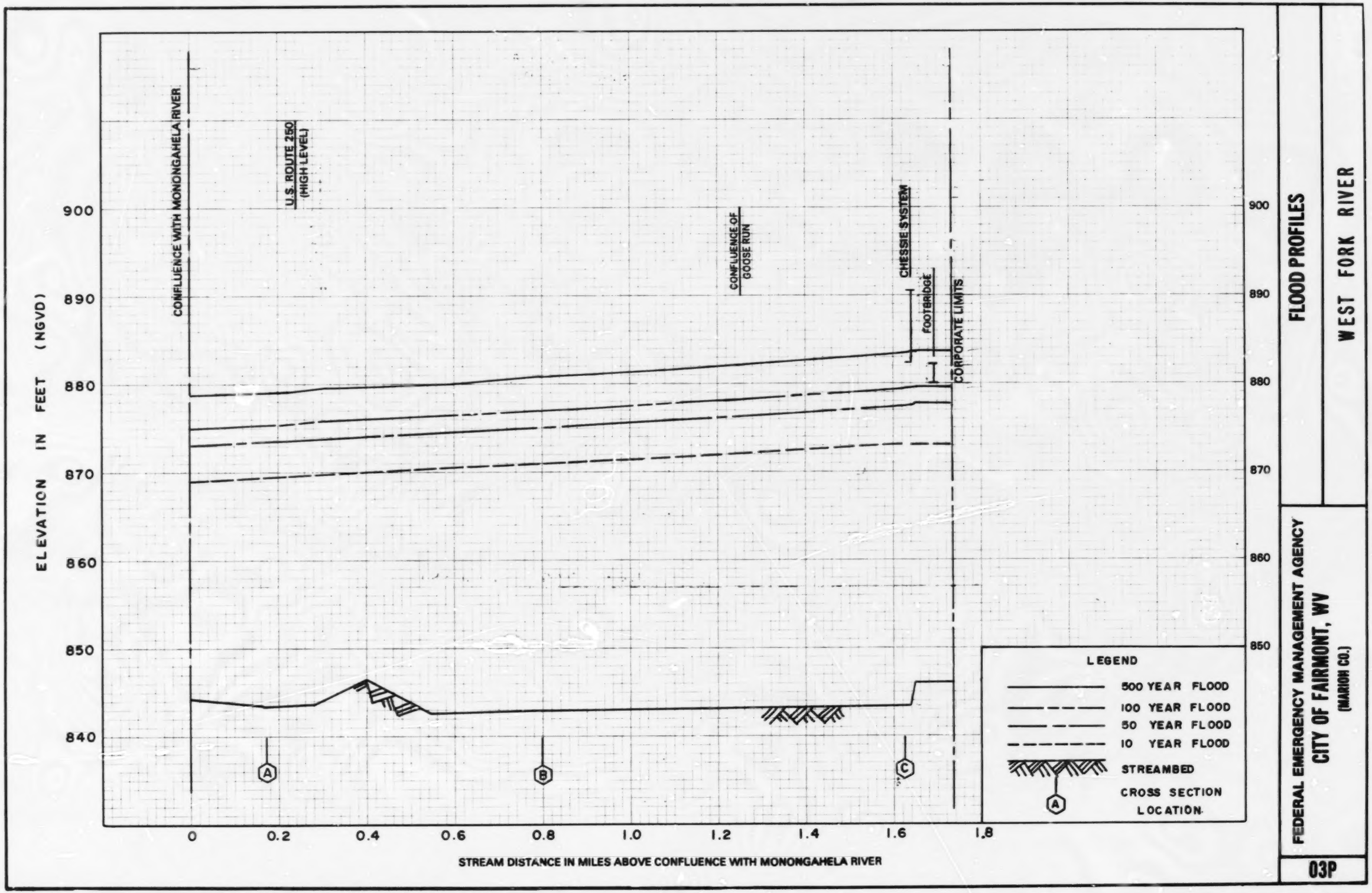

FLOOD PROFILES

WEST FORK RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
CITY OF FAIRMONT, WV
(MARION CO.)

03P

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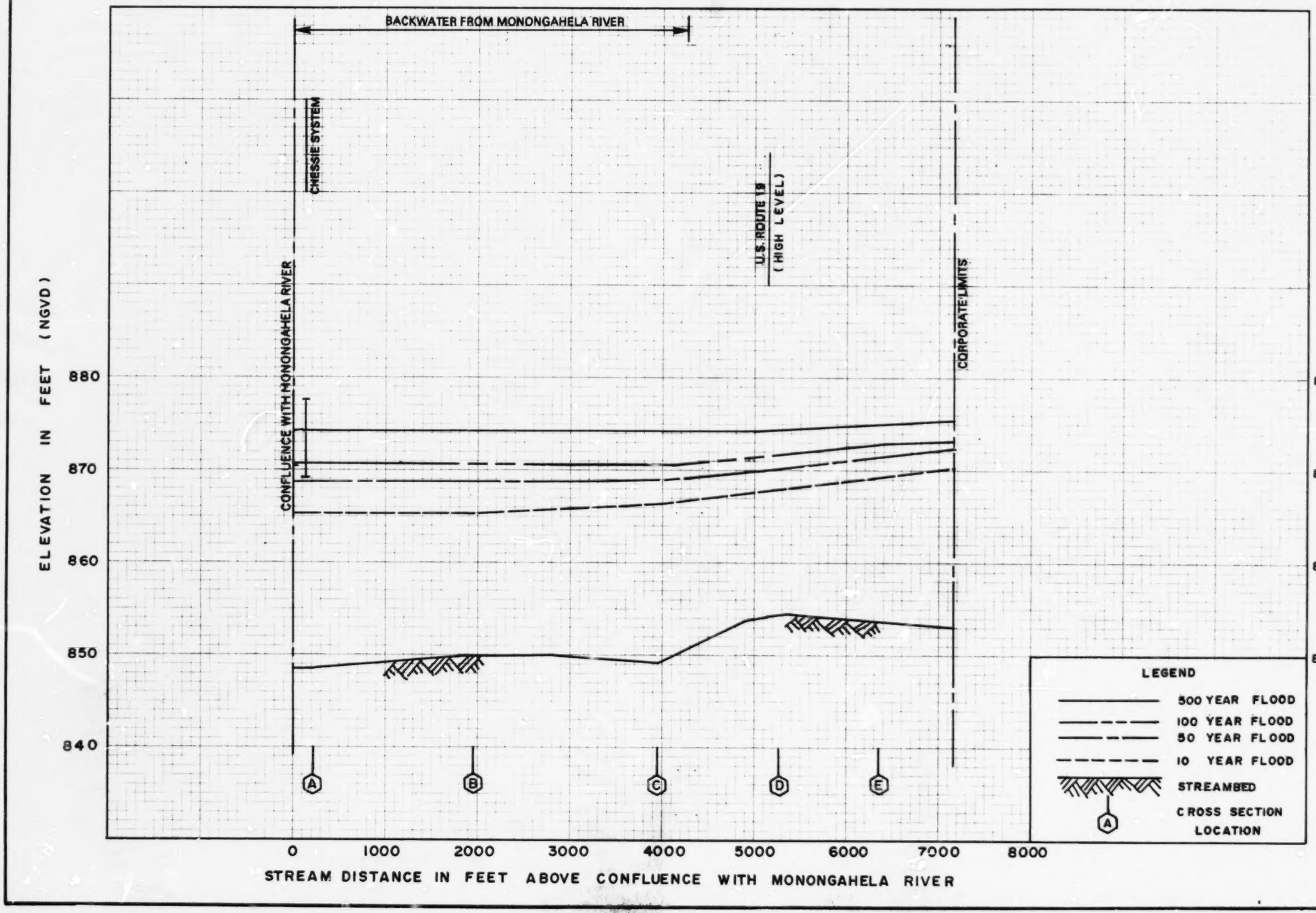

FLOOD PROFILES

BUFFALO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF FAIRMONT, WV

(MARION CO.)

04P

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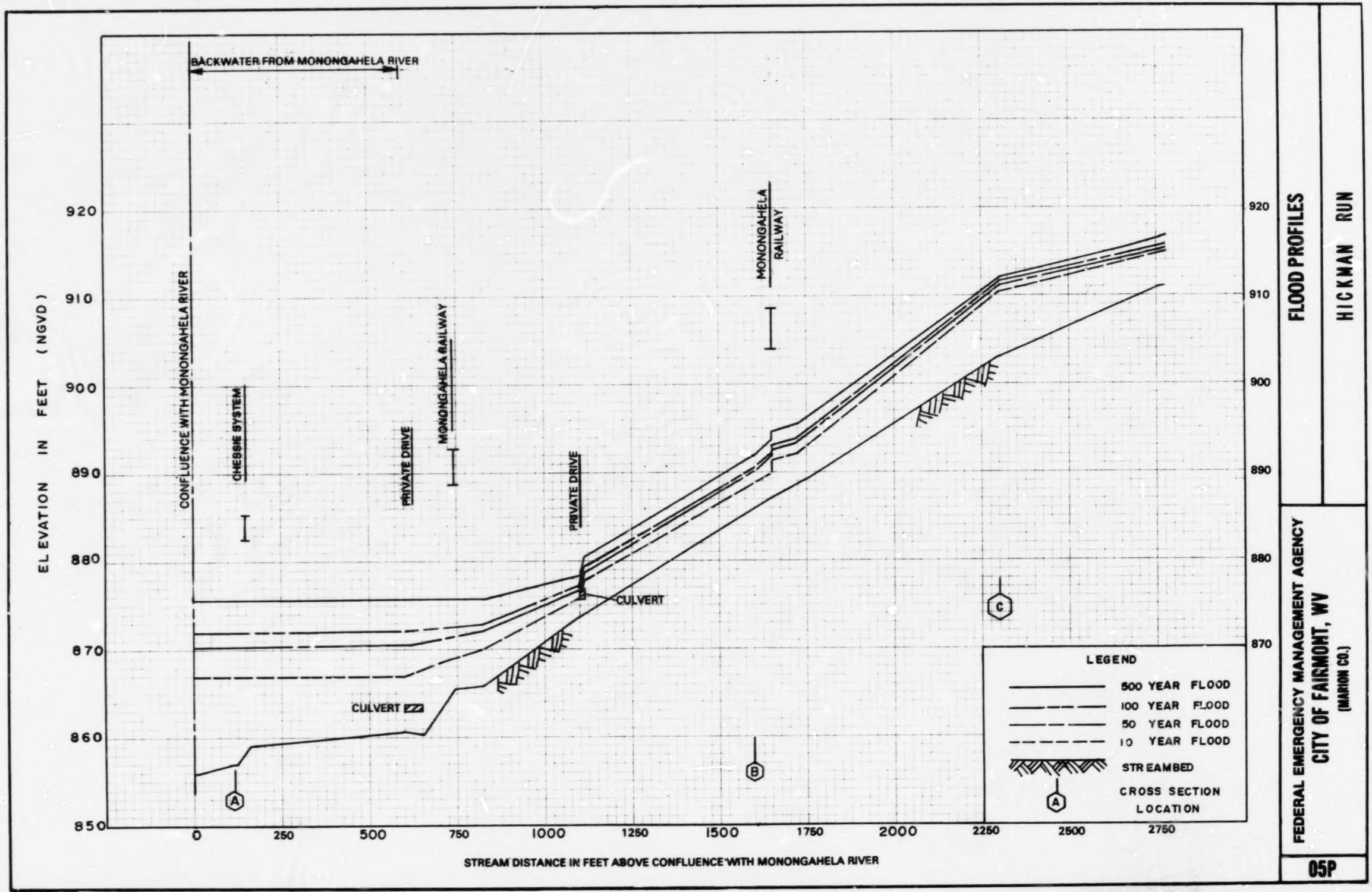

FLOOD PROFILES

HICKMAN RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
CITY OF FAIRMONT, WV
(MARION CO.)

05P

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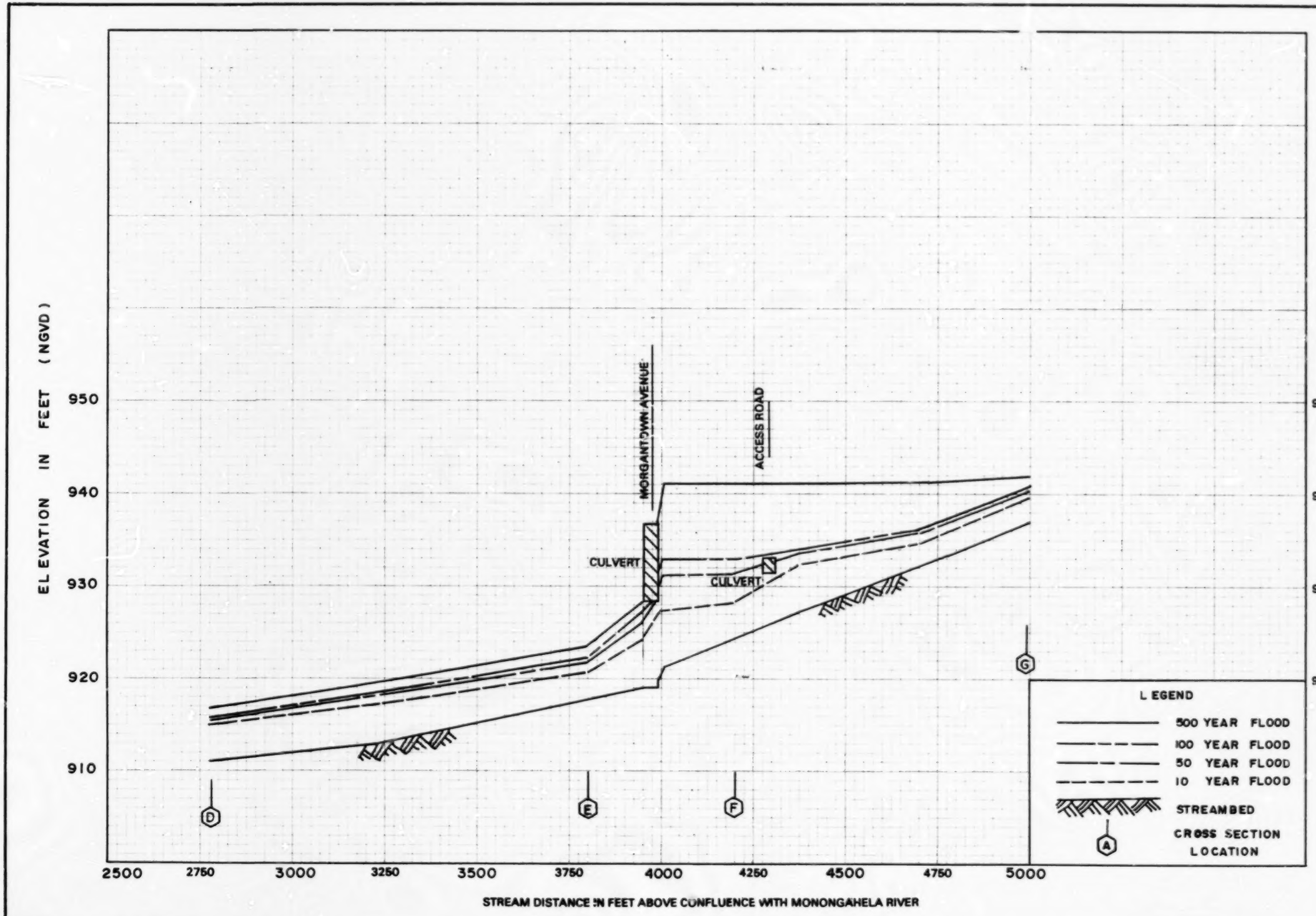

FLOOD PROFILES

HICKMAN RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
CITY OF FAIRMONT, WV
(MARION CO.)

06P

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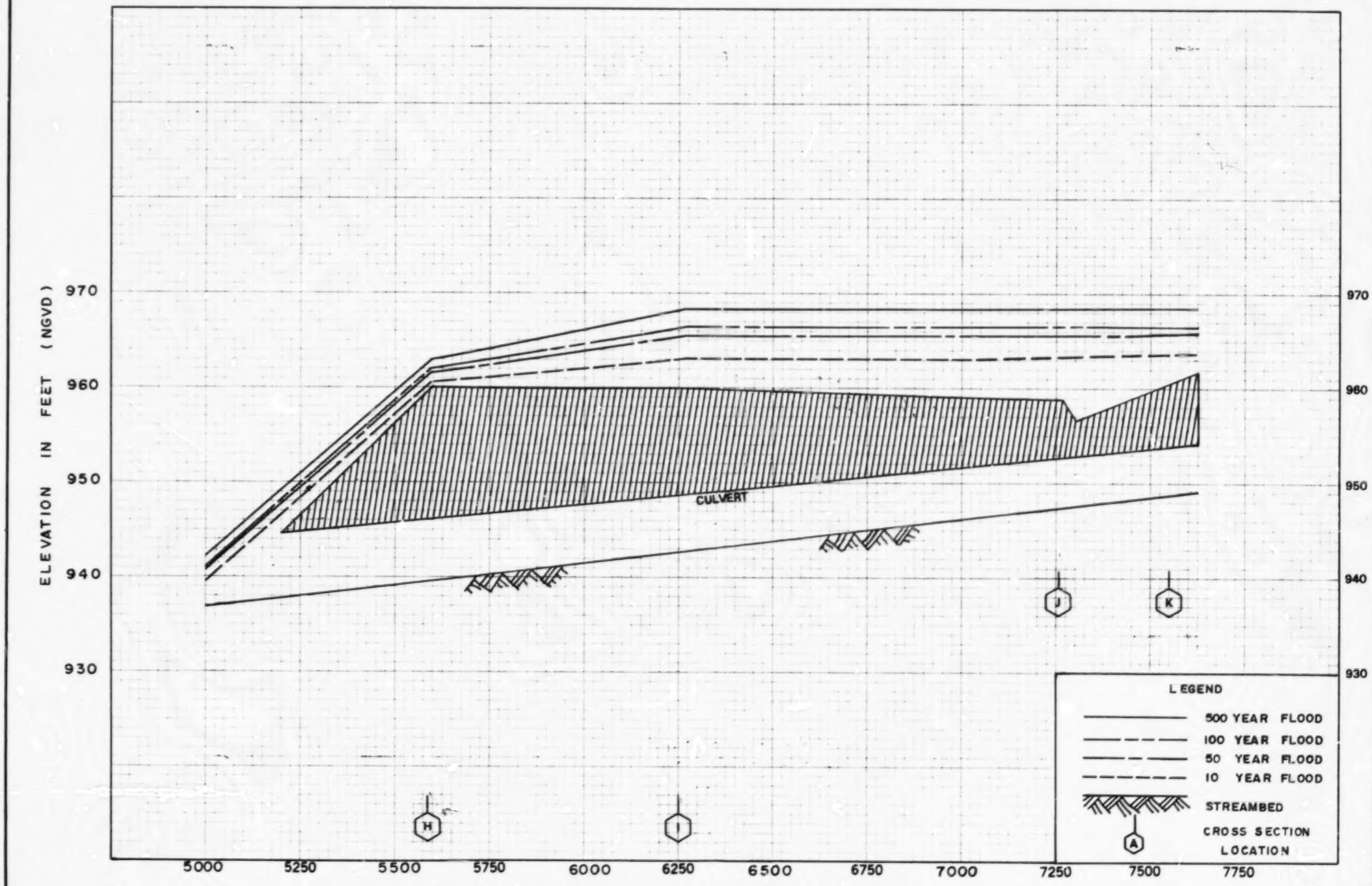

FLOOD PROFILES

HICKMAN RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF FAIRMONT, WV

(MARION CO.)

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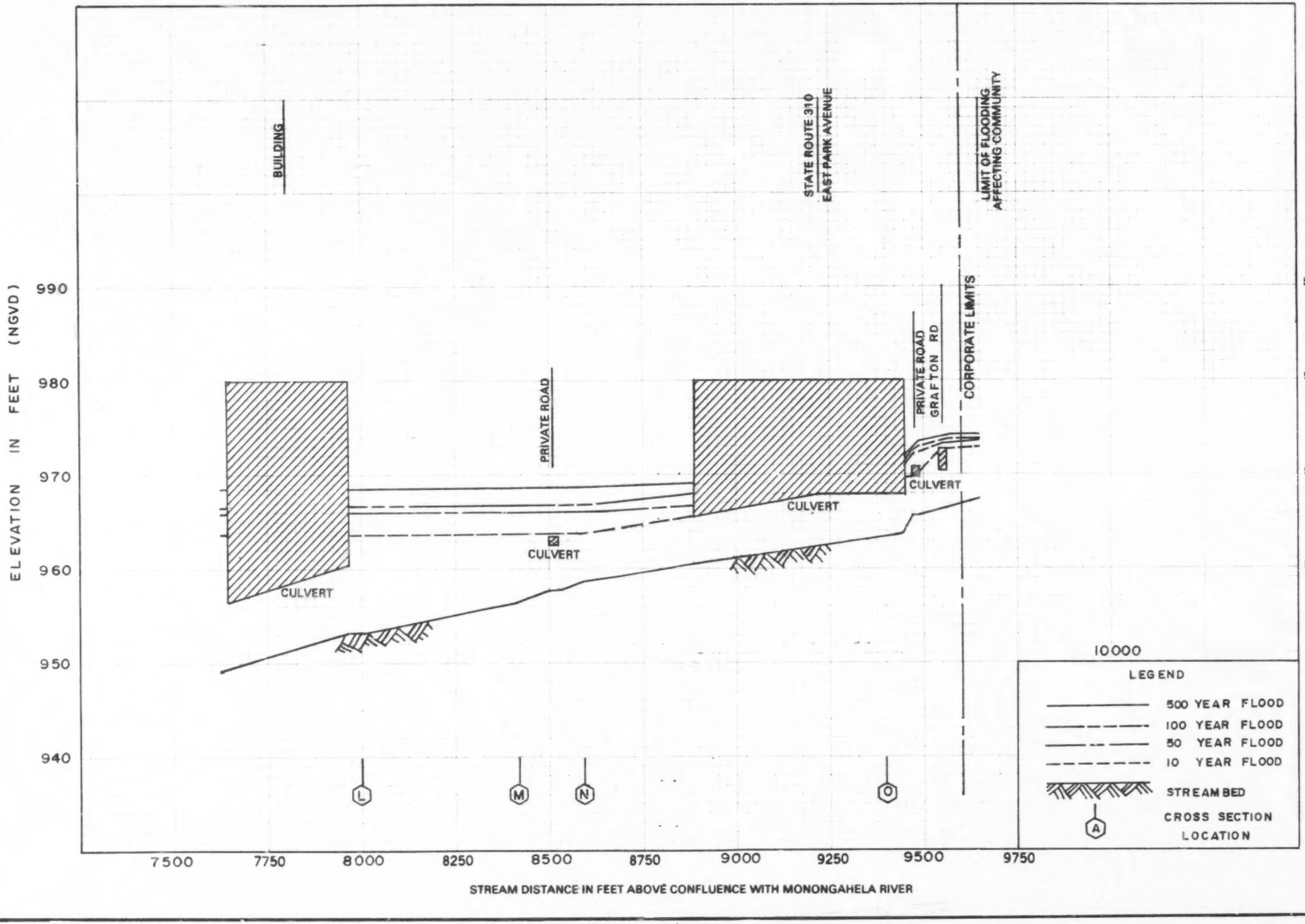

FLOOD PROFILES

HICKMAN RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF FAIRMONT, WV

(MARION CO.)

08P

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